CLAIMS

WHAT IS CLAIMED IS:

1. A high fidelity sound system for a mobile platform, said system comprising:

a plurality of panels forming interior surfaces of a passenger cabin,

a plurality of exciters, at least one exciter affixed to selected panels, the exciters adapted to resonate the panels to generate sound waves; and

a processing center that controls the exciters so that each exciter generates sound waves having frequencies within a specific bandwidth that is based on the panel to which each exciter is affixed.

2. The system of Claim 1, wherein the processing center further controls the exciters so that the amplitudes of the sound waves having frequencies near a lower outer boundary range of each bandwidth are attenuated and the sound waves having frequencies near an upper outer boundary range of each bandwidth are selectively increased or attenuated to create a smooth frequency cross-over.

3. The system of Claim 2, wherein the processing center further controls the exciters so that a phase timing of the sound waves generated by each exciter is adjustable to coordinate the phase timings among all the sound waves so that sound emanating from the panels is reproduced correctly.

4. The system of Claim 3, wherein the processing center includes:

a frequency equalizer that controls the frequencies of the sound waves generated by each exciter;

a cross-over point adjustment device that controls the amplitudes of the sound waves having frequencies near the outer boundaries of the bandwidths; and

a frequency delay device that controls the phase timing of the sound waves.

5. The system of Claim 3, wherein the processing center includes a processor adapted to control the frequencies, the phase timing, and amplitudes of the outer boundary frequencies of the sound waves.

6. The system of Claim 1, wherein the panels include at least one sidewall panel, and wherein the processing center is adapted to:

control the exciters so that sound waves generated from the sidewall panel have frequencies within a bandwidth of approximately 200 Hz to 18 kHz; and

control amplitudes of the sound waves such that the amplitudes of sound waves with frequencies between approximately 400 Hz and 15 kHz are modulated to be approximately level, while the amplitudes of sound waves having outer boundary frequencies are attenuated.

7. The system of Claim 1, wherein the panels include at least one ceiling panel, and wherein the processing center is adapted to:

control the exciters so that sound waves generated from the ceiling panel have frequencies within a bandwidth of approximately 300 Hz to 18 kHz; and

control amplitudes of the sound waves such that the amplitudes of sound waves with frequencies between approximately 600 Hz and 15 kHz are modulated to be approximately level, while the amplitudes of sound waves having outer boundary frequencies are selectively increased or attenuated.

8. The system of Claim 1, wherein the panels include at least one floor panel, and wherein the processing center is adapted to:

control the exciters so that sound waves generated from the floor panel have frequencies within a bandwidth of approximately 40 Hz to 12 kHz; and

control amplitudes of the sound waves such that the amplitudes of sound waves with frequencies between approximately 60 Hz and 10 kHz are modulated to be approximately level, while the amplitudes of the sound waves having frequencies within a range of approximately 40 Hz to 60 Hz are attenuated and the sound waves having frequencies within a range of approximately 8 Hz to 12 Hz are selectively increased or attenuated to create a smooth frequency cross-over.

9. The system of Claim 1, wherein the exciters are distributed throughout the passenger cabin in a support array such that high fidelity sound fills a large sound field that includes all normal listening areas of the cabin.

10. A method for producing high fidelity sound within a passenger cabin of a mobile platform, said method comprising:

affixing at least one of a plurality of exciters to selected panels that form interior surfaces of the passenger cabin;

driving each exciter to resonate the panels to generate sound waves; and

processing signals that drive the exciters to contour the sound waves generated by each exciter based on the panel to which each exciter is affixed so that high fidelity sound is produced throughout the passenger cabin.

11. The method of Claim 10, wherein processing the signals comprises modulating the signals so that each exciter generates sound waves having frequencies within a specific bandwidth that is based on the panel to which the exciter is affixed.

12. The method of Claim 11, wherein modulating the signals comprises:

regulating the signals so that sound waves generated from the panels that form a sidewall of the passenger cabin have frequencies within a bandwidth of approximately 200 Hz to 18 kHz; and

modulating amplitudes of the sound wave such that the amplitudes of the sound waves with frequencies between approximately 400 Hz and 15 kHz are modulated to be approximately level, while the amplitudes of sound waves having outer boundary frequencies are attenuated.

13. The method of Claim 11, wherein modulating the signals comprises:

regulating the signals so that sound waves generated from the panels that form a ceiling of the passenger cabin have frequencies within a bandwidth of approximately 300 Hz to 18 kHz; and

modulating amplitudes of the sound wave such that the amplitudes of the sound waves with frequencies between approximately 600 Hz and 15 kHz are modulated to be approximately level, while the amplitudes of sound waves having outer boundary frequencies are attenuated.

14. The method of Claim 11, wherein modulating the signals comprises:

regulating the signals so that sound waves generated from the panels that form a floor of the passenger cabin have frequencies within a bandwidth of approximately 40 Hz to 12 kHz; and

modulating amplitudes of the sound wave such that the amplitudes of the sound waves with frequencies between approximately 60 Hz and 10 kHz are modulated to be approximately level, while the amplitudes of sound waves having outer boundary frequencies are selectively increased or attenuated .

15. The method of Claim 11, wherein processing the signals comprises modulating the signals so that the amplitudes of the sound waves having frequencies near a lower outer boundary range of each bandwidth are attenuated and the sound waves having frequencies near an upper outer boundary range of each bandwidth are selectively attenuated or increased to reduce distortion caused by non-linear frequency cross-over and inability of the panels to resonate at the outer boundary frequencies, thereby creating a smooth frequency transition.

16. The method of Claim 10, wherein processing the signals comprises modulating the signals so that a phase timing of the sound waves generated by each exciter is adjustable to coordinate the phase timings among all the sound waves so that sound emanating from the panels is reproduced correctly.

17. The method of Claim 10, wherein, affixing the exciters to selected panels comprises attaching the exciters to selected panels throughout the passenger cabin in a support array such that high fidelity sound fills a large sound field that includes all normal listening areas of the cabin.

18. A mobile platform comprising:

a passenger cabin including a plurality of panels that form an interior surface of the passenger cabin; and

a sound system that provides high fidelity sound throughout the passenger cabin, wherein the sound system includes:

a plurality of exciters, at least one exciter affixed to selected panels throughout the passenger cabin to resonate the panels to generate sound waves; and

a processing center that processes signals that control the exciters to thereby contour the sound waves generated by each exciter based on the panel to which each exciter is affixed.

19. The mobile platform of Claim 18, wherein the processing center includes a processor adapted to modulate the signals so that each exciter generates sound waves having frequencies within a specific bandwidth that is based on the panel to which the exciter is affixed.

20. The mobile platform of Claim 19, wherein the panels include at least one sidewall panel and wherein the processor is further adapted to modulate the signals such that:

sound waves generated from the sidewall panel have frequencies within a bandwidth of approximately 200 Hz to 18 kHz;

amplitudes of sound waves within a range of approximately 400 Hz to 15 kHz are modulated to be approximately level; and

amplitudes of sound waves having outer boundary frequencies are progressively attenuated.

21. The mobile platform of Claim 19, wherein the panels include at least one ceiling panel and wherein the processor is further adapted to modulate the signals such that:

sound waves generated from the ceiling panel have frequencies within a bandwidth of approximately 300 Hz to 18 kHz;

amplitudes of sound waves within a range of approximately 600 Hz to 15 kHz are modulated to be approximately level; and

amplitudes of sound waves having outer boundary frequencies are progressively attenuated.

22. The mobile platform of Claim 19, wherein the panels include at least one floor panel, and wherein the processor is further adapted to modulate the signals such that:

sound waves generated from the floor panel have frequencies within a bandwidth of approximately 40 Hz to 12 kHz;

amplitudes of sound waves within a range of approximately 60 Hz to 10 kHz are modulated to be approximately level; and

amplitudes of sound waves having frequencies near a lower outer boundary frequency range are progressively attenuated and the sound waves having frequencies near an upper outer boundary range are selectively either increased or progressively attenuated.

23. The mobile platform of Claim 19, wherein the processor is further adapted to modulate the signals so that the amplitudes of the sound waves having frequencies near a lower outer boundary range of each bandwidth are progressively attenuated and the sound waves having frequencies near an upper outer boundary range of each bandwidth are selectively either increased or progressively attenuated to reduce distortion caused by frequency cross-over and inability of the panels to resonate at the outer boundary frequencies, thereby creating a smooth frequency transition.

24. The mobile platform of Claim 19, wherein the processor is further adapted to modulate the signals so that a phase timing of the sound waves generated by each exciter is adjustable to coordinate the phase timings among all the sound waves so that sound emanated from the panels is reproduced correctly.

25. The mobile platform of Claim 18, wherein the processing center includes at least one of:

a frequency equalizer adapted to modulate the signals so that each exciter generates sound waves having frequencies within a specific bandwidth that is based on the panel to which the exciter is affixed;

a cross-over point adjustment device adapted to modulate the signals so that the amplitudes of the sound waves having frequencies near a lower outer boundary

range of each bandwidth are progressively attenuated and the sound waves having frequencies near an upper outer boundary range of each bandwidth are selectively either increased or progressively attenuated to reduce cross-over distortion and create a smooth frequency transition; and

a frequency delay device adapted to modulate the signals so that a phase timing of the sound waves generated by each exciter is adjustable to coordinate the phase timings among all the sound waves generated from the panels so that sound emanating from the panels is reproduced correctly.

26. The mobile platform of Claim 25, wherein the panels include at lease one sidewall panel, at least one ceiling panel, and at least one floor panel, and wherein the frequency equalizer is further adapted to modulate the signals such that:

sound waves generated from the sidewall panel have frequencies within a bandwidth of approximately 200 Hz to 18 kHz;

sound waves generated from the ceiling panel have frequencies within a bandwidth of approximately 300 Hz to 18 kHz; and

sound waves generated from the floor panel have frequencies within a bandwidth of approximately 40 Hz to 12 kHz.

27. The mobile platform of Claim 18, wherein the exciters are affixed to selected panels throughout the passenger cabin in a support array such that high fidelity sound fills a large sound field that includes all normal listening areas of the cabin.